METHOD FOR IMPROVING THE SETUP OF TELEPHONE-TO-TELEPHONE CALLS

5 ## Field of the invention

Generally, the present invention relates to Internet telephony and intelligent networks (IN) function.
More specifically, the present invention relates to a
10 method for improving the setup of telephone-to-telephone calls using telephones connected to a PSTN/ISDN access network and using a separat network, especially Internet as a substantial by-pass network, special telephone gateways (GW) forming bridges between the access network
15 and said by-pass network, and connections being established between the user telephones (A,B) and the gateways (GW) that bridge the call.

20 ## Background of the invention

The application area of the present invention has been developed in connection with low tariff international telephone-to-telephone calls using the Internet as the main
25 carrier network, but the general aspect of the invention may also be related to any quality of service required.

Furthermore, the present invention is applicable not oly to international and long distance services but also to
30 any other geographically segmented services (e.g. local, regional, national).

Users have telephones connected to the PSTN/ISDN network. The Internet can be used to carry portions of the tradi-
35 tional PSTN/ISDN telephone-to-telephone calls. Special Internet telephony gateways GW form bridges between the PSTN/ISDN access network and the Internet (which acts as the carrier network).

In a traditional telephone-to-telephone call, a connection between two parties is established at the call set-up phase. The originating party and the terminating party are identified by their respective telephone numbers

5   (caller A-num and callee B-num) during the set-up phase. Call logic is handled by the PSTN/ISDN network.

In a telephone-to-telephone call using the PSTN/ISDN network as the access network and the Internet as the main carrier network, connections must be established

10 between the user telephones and the gateways that bridge the call. The present invention presents a solution to the handling of call-establishment to the originating gateway. Extensions and enhancements to the basic invention are described later.

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Prior art

Existing solution and problems with these

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Referring to Figure 1, there will now be given a description about how a traditional internation call path is established.

The known solutions handle call establishment in two

25 phases. First, the caller (A) is required to set up a connection to a preferred originating gateway (Gwa). Second, the caller is required to dial the desired number that identifies the terminating telephone (B-num).

As an illustration, a typical, although simplified, call

30 handling sequence is as follows:

1. The caller (A) obtains a PSTN/ISDN connection to an originating gateway (Gwa) by dialing the gateway number.

2. GWa sends a new dial tone or a voice message to A to

35   indicate that the connection has been established.

3. The caller (A) dials the number that identifies the
   callee (B). (The gateway may extract the B-number from
   the connection by interpreting Dual Tone Multiple
   Frequency (DTMF) signals. Prior to this A may need to
5 enter a PIN number or similar for authorization
   purposes).

   4. GWa performs a number analysis on the B-number to
      find the closest GW (Gwb) to B.

   5. GWa establishes a data connection (connection
10   oriented or connectionless) to the terminating gateway
      (Gwb) and transfers the B-number to Gwb using the data
      network.

   6. GWb in turn establishes the final PSTN/ISDN
      connection to the called party (B).

15 One advantage of the known solutions, in this context, is
   that they make use of standard PSTN/ISDN functions.
   However, the known solutions require the caller to handle
   the call set up in two distinct phases which is
   cumbersome. The caller is also required to know the
20 telephone number of the preferred (i.e., closest) gateway.
   Indeed, the caller may need to keep a list of gateway
   telephone numbers if the preferred one is busy, or if it
   is down, or if other circumstances make it unavailable.

   There are also other problems to the known solutions.
25 These are addressed in a later chapter which provides
   extensions to the present invention described prior
   thereto.

Objects of the present invention

30 An object of the present invention is to provide a method
   for improving the setup of telephone-to-telephone calls in
   relation to the prior art procedures.

Another object of the present invention is to provide a method by which the caller is allowed to handle the call set-up in one single phase, as in the case of traditional "local" telephone calls.

5   More specifically, an object of the present invention is to make the associated gateways transparent to the caller.

Still another object of the present invention is to utilize Internet telephony and intelligent networks (IN) functions in a far more efficient and less costly manner.

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Brief disclosure of the invention

The above objects are achieved in a method as stated in the preamble, which according to the present invention is characterized in that for the purpose of making the ga-
15   teways transparent to the caller (A) the method allows the caller (A) to dial a by-pass network service prefix together with the number of the callee (B).

More specifically, it is according to the invention sug-
20   gested that said by-pass network service prefix, i.e. an IN service prefix is adapted to identify the relevant IN service for thereby routing the call to an IN node which can execute this IN service.

25   In other words, the present invention allows the caller to handle the call set-up in one single phase, just as in case of conventional telephone calls, at the same time as the gateways appear transparent to said caller.

30   Further features and advantages of the present invention will appear from the following description taken in con-junction with the enclosed drawings, as well as from the appending patent claims.

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Brief disclosure of the drawings

Fig. 1 is a sketch illustrating a traditional international call path.

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Fig. 2 is a sketch illustrating an embodiment of the method according to the present invention.

10 Detailed description of embodiments

Fig. 1 illustrates a traditional international call path, which has been discussed previously, and wherein the set-up of telephone-to-telephone calls are made using

15 telephones connected to a PSTN/ISDN access network and using a separate network, here the Internet as a substantial by-pass network, special telephone gateways GWa and GWb forming bridges between the access network and said by-pass network, and connections being established betwe-

20 en a caller telephone A and a callee telephone B through appropriate gateways GWa and GWb.

An embodiment of the present method is illustrated in Fig. 2, wherein the handling of call establishment will

25 only take place in one phase.

More specifically, the present solution uses the Intelligent Network to:

30 1. Allow the user to establish a call in one single phase.

The user dials one number: IN service prefix + B-number. IN service prefix identifies the IN service: 'International calls over the Internet'. IN service prefix is used to route the call to the IN node which executes

35 this IN service.

2. Automatically find the closest/available gateway

The IN service 'International calls over the Internet' will find the closest GW by analysing the A-number. The service can also route to alternative Gws if the closest is busy, etc.

5   3. Establish call to the GW

The IN service will establish the call to GW, hereby named Gwa. In the call setup the Gwa number is included as destination number. In addition, the A and B-number is included.

10   A proposal/example on how this can be transferred on ISUP (IAM message)/DSS1 (SETUP message):

                    CallingPartyNumber: A-number
                    CalledPartyNumber: Gwa-number
                    RedirectingNumber: B-number

15   The information flow (see Figure 2) is as follows:

            a = A dials: (IN service prefix + B-number) in one
                        sequence
            b = Call routed to IN:
                    CallingPartyNumber: A-number
20   CalledPartyNumber: (IN service prefix +
                                        B-number)
            c = Call routed to Gwa:
                    CallingPartyNumber: A-number
                    CalledPartyNumber: Gwa-number
25   RedirectingNumber: B-number

Restrictions

1. The invention couples gateway functionality with IN
30   which makes the gateway equipment dependent on IN functionality. The provider of such a service becomes dependent on an operator with the specific IN functionality.

2. Still address analysis in GWa (see Extensions).

Advantages

• Call establishment in one step only.

• Since IN service logic is coupled to the GW application,
value added functionality can easily be included (such as
automatically finding the closest or available gateway).

• Number analysis can now be coupled with other services
such as short numbers for a virtual network, and UPT.

Extensions and enchancements to the present invention

The problem area:GWa still needs to analyse the B-number
to find the GW closest to user B. Having these number
analysis functions distributed implies that many Gws must
be updated when changes in the network occur. This is a
network management problem which the extension to the
basic invention solves.

Existing solutions and problems with these: The Gws can
perform complete number analysis functions with B-number
as input and Gwb address as result. This analysis must
then be in every GW and the network will be hard to
maintain.

The invention: An extension to the basic invention can be
made to solve the problem in such a way as to find the
closest terminating gateway for any terminating B- number.

IN can be used to locate the terminating gateway. Suppose
that A calls a B-number. In addition to finding the E.164
number to Gwa, IN can also find the IP-address to Gwb
which is the gateway closest to the user B.

1. The IN maintains a list of the gateways, with their
respecitve IP-address and the respective area code(s).

2. Based on the area code of the B-number the IP-address
to the closest GW is found.

3. In the call setup towards Gwa the IP-address of Gwb is
included.

5   4. Gwa uses the received Gwb IP-address in the remaining
call handling process.

A proposal/example on how this can be transferred on ISUP
(IAM message)/DSS1 (SETUP message):

                        CallingPartyNumber: A-number
10   CalledPartyNumber: Gwa-number
                        RedirectingNumber: B-number
                        Subaddress: Gwb IP-address

The information flow (see Figure 2) is as follows:

        a = A dials: (IN service prefix + B-number)
15   in one sequence
        b = Call routed to IN:
                CallingPartyNumber: A-number
                CalledPartyNumber: (IN service prefix +
                                        B-number)
20   c = Call routed to Gwa:
                CallingPartyNumber: A-number
                CalledPartyNumber: Gwa-number
                RedirectingNumber: B-number
                Subaddress: Gwb IP-address

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Broadening

The application has only addressed the Internet as the
carrier or bypass network but the application can be
broadened to, in general, address networks based on IP-
30 technology and even to other packet based networks or
technology, such as Frame Relay, ATM, hybrids of these,
and so on.

Furthermore, the present invention is applicable not oly
to international and long distance services but also to

any other geographically segmented services (e.g. local, regional, national).

5   References
WO-SE00680: "Speech connection set-up method for interconnected networks registering network address of users who has a telephone and PC on network, with telephone system and uses address when making call
10 connection".

Comments: The WO-SE00680 patent is related to this patent application in the sense that it too uses certain IN functions to solve certain addressing problems related to the domain of gateways. Note, however, that it addresses a
15 different problem within this domain. The following is a list to illustrate some of the differences:

• WO-SE00680 addresses an application area that have users connected to special PCs (PC connected telephones) - not plain old PSTN/ISDN telephones.

20 • WO-SE00680 uses IN primarily to locate called users using special PCs on a data network - not handle call set-up of telephone-to-telephone calls over the internet in one single phase.

• WO-SE00680 uses a register function to keep track of the
25 location of the users and the gateway that the respective users have registered with - this patent application does not use such an explicit register function.

• WO-SE00680 transfers the IP-address of a called user to the gateway that the user has a priori registered with -
30 In its basic form this application only transfers the B-number of the called user. In its extended form the B-number and the IP-address of the terminating gateway is transfered to the originating gateway for the purpose of addressing locating the nearest gateway.